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Monitoring PRRS based on laboratory submissions: a simulation study to evaluate detection algorithms performance

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Annual Scientific Conference and **Annual General Meeting** of the **European College of Veterinary Public Health**

The Challenges of Cross-Border Trade

Belgrade, 7-9 October 2015

Proceedings of the Annual Scientific Conference and the Annual General Meeting of the European College of Veterinary Public Health, 7-9 October 2015, Hotel Metropol Palace, Belgrade, Serbia.

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Presidential foreword

Dear Colleagues, Diplomates and Resident of the European College of Veterinary Public Health, distinguished guests,

On behalf of the conference organisers and of the ECVPH Council, I wish to thank you for having travelled to join us at this conference on "The Challenges of Cross-Border Trade". The ECVPH decided to organise this Conference because our organisation's mandate is to improve Public Health, and we all know that this require competent veterinarians, which means they must be well trained, in terms of both initial and continuing training. As all of you are players in veterinary education, we wish to engage you in dialogue throughout these two conference days so that together we can help veterinary education to evolve.

Veterinarians are entrusted with the task of preventing and controlling the major biological risks threatening society in our globalised world. We therefore have invited speakers that have a direct experience in the management of import of animals and foods in the EU and invited some Diplomates and Residents of our College to bring their knowledge to enable us to understand the complexity of our world and to find solutions to difficult and highly diverse issues. As usual we have asked our Residents and Diplomates to bring to your attention the work that they are doing in research and education and overall 33 abstracts were submitted. They concern Animal Health Surveillance and Programmes, Epidemiology and Zoonoses, Antimicrobial Use and Resistance, Meat Inspection and Food Safety, Training and Education. Four of them have been selected for a short presentation. Please dedicate some time to look at the posters and to discuss with the authors.

I wish you all a pleasant stay in Belgrade and a stimulating conference that will, I am certain, help veterinary education to evolve.

Thank you,

Marcello Trevisani
ECVPH President

Abstracts

Key note lecture 1

Import-export requirements: the experience gained by FVO audits in Member States & third countries

Bruno Battilocchi, European Commission - DG SANTE – Food & Veterinary Office

The European Union (EU) is one of the largest players in international trade of foodstuffs, both of animal and non-animal origin, importing relevant quantities of fruits, vegetables and beef, whilst exporting large amounts of pork, dairy and meat products. Import and export are regulated by legal requirements which have been negotiated between the parties and that should be complied with before the consignments of foodstuffs are cleared at the borders of the importing country.

The Food and Veterinary Office (FVO) is part of the Directorate General for Health and Food Safety (DG SANTE) and it is the audit body of the EU Commission verifying the compliance of foodstuffs produced or imported into the European Union with the legal requirements laid down in the Community legislation.

The FVO has in past years, in addition to its routine audit tasks, verified the compliance of foodstuffs of animal and non-animal origin produced in the EU and intended for export to third countries with the import requirements of those countries; FVO auditors have also accompanied and supported staff of the national competent authorities of Member States when auditors of importing third countries have audited their production and control systems.

Moreover, the FVO is involved in the legislative process, as FVO advice (in the framework of the "inter-services consultation" procedure) is requested and considered when preparing new legislation or amending import certificates.

The experience gained by the FVO on verification and assessment of import-export requirements, internationally recognised for competence and excellence, could be further structured and strengthened taking a more proactive role in the future, to allow for EU foodstuffs an easier access to foreign markets and to aim contributing to job and investments growth in the EU.

The outcomes of such strategy might be the issue of guidance documents and overview reports which can be useful for more stakeholders interested in such markets.

Workshops

1: Internal and external communication on food safety risks – how to improve understanding of each other

Boris Antunovic (University of J.J. Strossmayer, Osijek)

Risk communication is defined for the purposes of the *Codex Alimentarius* Commission as "The interactive exchange of information and opinions throughout the risk analysis process concerning hazards and risks, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions."

In order to understand level of risks and uncertainty and take appropriate decisions, risk managers need clear and unambiguous information from the risk assessors. This two-way communication that takes part mostly between the food safety experts we consider as “internal communication”. As risk assessment terminology has been in parallel developing by different international standard-setting organisations (CAC, OIE, IPPC), covering different fields (food safety, animal health and plant health), the neediness for better harmonisation of terminology has gained importance, especially from the reason of using the appropriate terminology for the purposes of defining the standards in the food trade (SPS Agreement of the WTO). The participant of the workshop will have an opportunity to discuss examples of categories for different levels of risk, uncertainty and other risk assessment terms.

The level of misunderstanding can even more increase when the level of risk is being explained to the general public, consumers, or everyone interested. This phase of interactive exchange of information between experts and non-experts we call “external communication”. Lessons learned from past food safety risk communication experiences have revealed great divergence between risk and the perception of risk. Factors about a hazard influence the perception of risk, which imposes different risk communication tasks that arise in risk analysis. Accordingly, we should consider communication as a two-way process of reaching mutual understanding, in which, participants not only exchange information but also create and share meaning. By the definition, risk is a function of the probability of an adverse effect, consequential to a hazard in food, which means that level of risk should be based on facts. But on the other side, we can find many factors that influence perception of risk that do not reflect the actual level of risk. Outrage is often cultivated by the media on purpose to boost ratings. The reason is that most people think dramatically, not quantitatively, and perceive risks and other situations based more on their beliefs than on any set of facts. Consequently, risk = (probability x consequence) + perceived risk. As a result, risk managers are often obliged to manage fears instead of risks.

Everyone has a privilege to worry about whatever it is and for whatever reasons. However, it is a task of good communicator to teach that if we are going to worry, to try worrying about important things. Instead of giving lessons, the communicator should use the K.I.S.S. (keep it short and simple) approach. The result should be proper informing and educating stakeholders, enhancement of trust and credibility, change of behaviour and getting people to take protective action.

Following the presentations, the participants will have opportunity to participate in interactive discussion about possibilities of improvement understanding of each other and development of efficient public statements on specific food safety issues.

2: Trade, policy, and public health: where do veterinarians fit in?

Jorge Pinto Ferreira (SAFOSO) & Marieme Fall (WTO)

Being a veterinarian is the dream of many children. And once one asks them why, the anwser is almost inevitably one: “Because I like (small) animals!” Along the way, of those that do actually fullfill their dream of becoming a veterinarian many end up, for a significant variety of reasons, working with food producing animals. And these will inevitably come across, one way or the other, with trade, policy and public health issues.

On the other hand, if one were to ask veterinarians the question: “Could you please name internatinal organizations working on your field?” Most probably the top anwsers would include the “World Organisation for Animal Health”, the “World Health Organization” or perhaps the “Food and Agriculture Organization”. The “World Trade Organization (WTO)” would probably be ranked lower – however, WTO activities and decisions have a major impact in many of the daily decisions that veterinarians (food animals clinicians, epidemiologists,…) take.

And how many veterinarians get formal training/education in trade and policy issues? Are they fully aware of their role in the system? In summary: where do veterinarians fit in?

This workshop aims at i. introducing the participants to the SPS agreement; ii. highlighting the role that WTO has when trade disputes come up and iii. providing (recent) examples of specific trade disputes, related with animals, food of animal origin.

The workshop will consist of a mixture of presentations/exercises and case studies. After a generic short introduction about WTO, participants will be divided in groups of two, and will be engaged in “serious gaming”, via pedagogic tools previously developed at WTO, for example about the SPS committee. The final session will be dedicated to real recent trade disputes related with animals/food of animal origin.

3: International trade of animal source foods from low income countries: the good, the bad and the ugly

Silvia Alonso (ILRI), Salome Dürr (VPHI, Bern) & Anna Fahrion (WHO)

The increasing involvement of low income countries in international trade of animals and food products creates incentives for the local livestock industry to progressively shift from small scale production to large private companies. Trade standards make it difficult for smallholder farmers to access the international market. While accessing the international market may have positive effects in countries, it can also have detrimental effects on countries' local economies and food security.

The workshop aims at providing a "reality check" regarding import of animal products into the EU from low income countries. Food security in developing countries is top priority on the international agenda. Understanding to what extent food security and other aspects in lower income countries are affected by the rules of a globalized market is of utmost importance. The workshop aims at providing a forum for participants to look at international trade from a different angle, and critically evaluate the broader effects of international standards. As an outcome of the workshop we will aim at drafting a list of key challenges and potential approaches to address them.

The workshop will focus on international trade of animal products from low and middle income countries to Europe. Beyond analysing the current requirements and standards set by importing countries for the protection of public health and the capacity of exporting countries to meet these, it will also look at an often neglected side: the relation between international trade and exporting countries' national economies and food security (self-sufficiency). Specifically it will look at the following implications of the international trade standards: (i) International trade standards as guards of public health ("the good"); (ii) feasibility of low income exporting countries to meet the standards with the national surveillance and monitoring systems ("the bad"); (iii) the wider impacts of international trade on national food security and smallholder farming ("the ugly").

The workshop will follow a "role-play" format, complemented by presentations of relevant information and discussions. Facilitators will input information, guide the activities and moderate the discussions.

Challenge session

Integrated foodborne diseases monitoring, surveillance and reporting

Ivan Nastasijevic (Institute of Meat Hygiene and Technology, Belgrade)

Foodborne diseases can originate from a wide variety of different foods and be caused by many different pathogenic organisms (e.g. bacteria or viruses) that have contaminated them at some point of the food chain, between farm and fork. The majority of foodborne diseases are of zoonotic origin, which means these infections are transmissible from animals to humans. A various foods can serve as sources of foodborne illness, with most frequently involved meat, poultry and fish; for instance, meat and meat products may be important sources of human infections with zoonotic foodborne pathogens: *Salmonella spp., Campylobacter jejuni/coli*, pathogenic VTEC O157 and non-O157, *Yersinia enterocolitica* and, to some extent, *Listeria monocytogenes*. The severity of these diseases in humans can vary from mild symptoms to life-threatening conditions (e.g. Hemolytic Uremic Syndrome – caused by VTEC O157).

The most frequent chain of events leading to foodborne illness involves food animals as healthy carriers of the pathogens; these organisms are faecally excreted and subsequently transferred to humans through production, handling and consumption of meat/poultry and other foodstuffs. In order to prevent foodborne zoonoses from occurring, it is important to identify the multiple sources of contamination along the food chain, `from farm to fork`. The effective monitoring of foodborne pathogens in the food chain continuum should be based on inter-sectoral collaboration between environmental, veterinary, food and health authorities. This should generate the useful evidence on distribution and concentration of foodborne pathogens at different points along the food chain needed for the risk analysis; it should also strengthen the position of the national food safety system, as well as food industry regarding export at international level.

Therefore, data originated from the monitoring system should be used for the evidence- and science-based risk assessment. Further, risk management should be based on the outcome of risk assessment, including technical feasibility, consumers behavior and cost–benefit analysis. The risk communication should be based on both, risk assessment and risk management defining the relationship between the major stakeholders (e.g. academia, competent authorities, food industry and consumers). The concept of integrated monitoring system should include food animals and foodstuffs and be founded on a modular approach: 1. Pre-harvest (on farm), 2. Harvest (abattoir), and 3. Post-harvest (food processing-retail). A well-designed sampling, testing and reporting protocols on pathogen occurrence/concentration in these three modules should be carried out. The harmonization of Serbian food safety legislation with EU `Zoonoses Directive` (2003/99/EC) requires that collection, evaluation and reporting data on zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks should be actively implemented. A national food safety policy should be evidence-based, ideally corresponding to defined public health goals and providing support to the food industry regarding export into international markets.

VPH issues in trading – Croatian experience

Tatjana Karacic & Jelena Djugum (Ministry of Agriculture, Croatia)

Country alignment and implementation capacity Chapter 12 – Food safety, veterinary and phyto-sanitary policy (all food safety aspects, veterinary and phytosanitary issues are covered in this negotiation chapter 12.)- reflects the EU's integrated approach to food safety aiming to assure a high level of food safety, animal health, animal welfare and plant health within the European Union through coherent farm-to-table measures and adequate monitoring, while ensuring the effective functioning of the internal market. The principal pre-requisites for a Candidate Country in this domain are the transposition of the EU legislation, and implementation by a properly structured and trained administration.

Before acssession to the EU, the Republic of Croatia has applied the "vertical legislative approach" for food safety area. Croatia's general legislation on food safety covered all main areas of EU food law and makes out a good basis for the further work on achiving full compliance with EU requirements. The Acts and Ordinances provided the legal framework, but this legislation was only partially complied with the hygiene rules set by the acquis. Before acssession, the trade between Republic of Croatia and other countries was held in accordance with the requirements defined in international treaties that the Republic of Croatia concluded with these countries, especially as a member of CEFTA (Central European Free Trade Agreement) in accordance with the provisions of the Central European Free Trade Agreement. In accordance with such requirements, untill the date of accession the trade of animal products between Croatia and other countries, was held with the conditions laid down in national legislation and in accordance with risk assessments that had been undertaken at the national level in relation to the movement of infectious animal diseases and assessment standards of veterinary public health in these countries.

In order to be able to efficiently participate in the EU market and maintain measures and rules of the EU internal common market, Croatia has transposed, implemented and enforcemented the EU acquis for food safety, veterinary and phytosanitary policy, including the development of the relevant administrative capacities. Hence this has enabled a direct application of the provisions of EU Regulations to the Croatian market. The Competent authority of the Republic of Croatia has developed the registers in accordance with Council Directive 90/425/EEC and Council Directive 89/662/EEC and carried out a classification of all food establishments by category based on the EU acquis which serves as a basis for a future National Programme for the upgradement of food establishments. After completion of the assessment and categorisation, establishments were classified into two categories – EU compliant and EU non-compliant, by which the phase of evaluation has been completed. Since October 2007, when Ordinances transposing the EU regulations came into force, all newly approved establishments were in compliance with EU rules. Every establishment that was not compliant with EU legislation, was required to apply for a temporary approval to operate, provided that it submits to the competent authority an upgrading plan with deadlines for particular stages of rectifying non-compliances. The Upgrading Plans Assessment Commission, established by competent authority, reviews the submited documentation and assesses its compliance with the relevant EU legislation, and gives consent for the granting of a temporary approval to the establishment concerned. Such establishment could only place its products on the market of the Republic of Croatia and on the market of third countries. Croatia has also taken the necessary steps to ensure that, as required by European legislation, laboratories carrying out analyses of samples taken during official controls are accredited to the required standards and implemented general rules for the performance of official controls

regularly, on a risk basis and with appropriate frequency to verify compliance with rules of feed and food law, animal heath and animal welfare rules.

In respect of the control systems in the internal market, the basic challenge for Croatia was to move from a national control system to a system without controls at the internal EU borders but with an emphasis on controls at the place of origin and non-discriminatory controls during transport and at the place of destination. Croatia was faced with the task of maintaining the efficiency of the national control system until the day of accession and at the same time preparing well in advance for the introduction of the internal market control system. The transition from a control system protecting the national-only territory to the internal market control system required in particular: abolishing controls at the internal EU borders, as well as import licenses, strengthening the controls at the place of origin and controls at the external EU border, preserving the safety of other member states by all necessary means including the competence to block specific regions of Croatia. Once Croatia has acceded to the EU, Croatia started directly applying rules of application concerning import from third countries (lists of approved countries, lists of countries with an approved residue control plan) and with whom the trade has been defined by international agreements concluded by the European Union.

From 17 veterinary BIPs in the Republic of Croatia at which border inspectors were constantly present Croatia has selected seven posts to be permanent border veterinary inspection posts (BIPs), of which 4 of them are at road border crossing, 2 are at seaports and 1 is at an airport.

For the Republic of Croatia in the field of trade but also in the entire food safety system two significant changes occurred. The Republic of Croatia has become part of a single internal European market where there are no barriers to trade and to which special rules apply to trade in animals and animal products and at the same time the external borders of the Croatian became a part of the external border of the European Union (the Republic of Serbia, Bosnia and Herzegovina and Montenegro) where inspections (veterinary, phytosanitary and sanitary) were carried out to determine whether the animal and the product which is imported from third countries into the European Union meet the high standards of food safety and hygiene that apply in the European Union.

TRACES (TRAde Control and Expert System)

Didier Carton (DG SANTE, European Commission)

TRACES is a multilingual online management tool for the control and certification of trade in animals, products of animal origin, feed and food of non-animal origin, as well as plants, seeds and propagating material.

TRACES is an e-government system following the requirements of the EU Digital Agenda towards dematerialisation of the health documents, and is an efficient tool to ensure:

• Traceability by keeping track of the movements, both within the EU and from non-EU countries.
• Exchange of information by enabling traders and competent authorities to easily obtain information on the movement of their consignments. TRACES speeds up the administrative procedures.
• Risk management by reacting rapidly in case of health threats by tracing back the movements of consignments and by facilitating the risk management of rejected consignments.
As a result, TRACES aims to strengthen the cooperation between Member States and with the EU partners, to facilitate the trade, to speed up the administrative procedures, to improve the risk management of health threats and to enhance the safety of the food chain, the animal health and the plant heath.

The origin of TRACES is the outbreak in Europe of the classical swine fever in 1997. A report of the Court of Auditors basis for a resolution from the European Parliament invited the EU Commission to improve the traceability of the animals' movement within the single market. The Animal health unit of the Directorate-General Health and Food Safety of the European Commission implemented TRACES and since its implementation in April 2004, TRACES proves to be an efficient tool for veterinary and public health authorities when it comes to respond promptly and in a coordinated manner to health threats.

But, if its very first objective is to improve the traceability of all the movements of live animals and goods throughout EU to protect the health of the consumers the animals and plants, TRACES' aim is also to facilitate the trade by simplifying the procedures and enhancing the cooperation with the EU trading partners. So, the digitalization of all procedures link with the certification process is on-going for example within EU with the pilot project on the digital bovine passport, outside EU with the introduction of the digital signature and at the border with the simplification of the clearance procedure in the framework of the customs single windows. This is in line with the Commission goals in particular with the declaration of 2015 as the Commission digital year.

If all of the Member States plus the EFTA countries are obliged to use the TRACES system, 42 non-EU countries and overseas territories have started to use TRACES as from 2008 on a voluntary basis, strengthening the relation with them.

So, about 30 000 users all over the world are issuing more than 1,5 million of certificates a year within TRACES, that is to say about 5000 a day; half of them for the EU single market trade the other half for the importation into EU and the EU border control.

The challenge is now to even better integrate all the other Commission sanitary informatics system such as RAFF, EUROPHYT and ADNS to build a sanitary single window to further improve the sanitary protection of EU.

Key note lecture 2

Export of animals to Third countries – implications and practical implementation

Ulrich Herzog (CVO, Austria)

Poster abstracts

Meat inspection and food safety at slaughter

P1: Need for condemnation of slaughtered pigs with presence of vertebral osteomyelitis?

Ana Teresa Monteiro, Isabel Pires, Lis Alban, Lüppo Ellerbroek, Madalena Vieira-Pinto

Vertebral osteomyelitis (VO) is an inflammation of the vertebrae medullar cavity. It is caused by a bacteremia secondary to skin trauma (e.g. tail biting), fractures, surrounding tissues (e. g. periodontitis), arthritis or other organs infection. Occasionally, VO in live pigs go undetected and/or untreated but can be found during post mortem inspection of finishing pigs at slaughter. VO represents a poorly understood complex issue that includes aspects related to animal health/welfare, food hygiene and economy.

The main objective was to gain knowledge about the importance of VO in slaughtered finishing pigs in Portugal.

We undertook a literature review. Moreover, we analysed data from pig meat inspection collected by the Portuguese Veterinary Authority during 2013. Visits to pig slaughterhouses were undertaken aiming at recording and characterizing carcasses with lesions indicative of VO.

According to the analysed data, VO is the main cause of post mortem condemnation of slaughtered pigs. Preliminary results from seven visits made to two abattoirs showed that among 10,044 slaughtered finishing pigs, 15 (0,1%) were condemned during post mortem inspection and from those 60% (9) were caused by VO. These nine cases presented different kinds of lesions (medular chronic abscesses, paravertebral abscesses, purulent lesion with medulla destruction).

The results underpin the importance of VO as a cause of post mortem condemnation of finishing pigs in Portugal. Independently of the lesion type (e.g acute or chronic), VO cases observed during post mortem examination are all totally condemned in Portugal, representing an important economic loss to the industry.

Microbiologivally studies should be undertaken to improve knowledge on post mortem condemantion criteria and the health risk associated with consumption of meat from pigs with VO. Hereby, the need for condemnation of slaughtered pigs with presence of VO can be assessed.

The work was supported by UID/CVT/00772/2013 financed by the Foundation for Science and Technology(FCT)

P2: Abattoir prevalence of suspected bovine tuberculosis in rural Uganda

Natascha Meunier, Lordrick Alinaitwe, Joseph Masinde, Richard White, Richard Kock

Passive surveillance during meat inspection and condemnation of suspected infected carcasses is currently the primary method of preventing bovine tuberculosis (BTB) from entering the food chain in Uganda. The aim of this study was to estimate the proportion of BTB cases in relation to other diseases affecting food safety in rural south-west Uganda.

The main Kasese district abattoir was followed over a period of one year recording macroscopic meat inspection findings and collecting histopathology and impression smears for ZN staining of suspected BTB tissues.

8067 cattle and 8540 sheep and goats were slaughtered in the period from 1 January 2014 until the 31 December 2014, with an average of 22 cattle and 24 sheep and goats per day. 210 animal parts were considered unfit for human consumption during this period. The proportion and reason for part or whole carcass condemnation is as follows: 56.2% liver fluke, 11.0% bleeding and bruising, 8.6% abscesses , 6.7% pneumonia, 4.8% BTB and 12.4% other reasons. Of the 10 reported suspected BTB cases, seven were suspect for BTB on histopathology, and acid fast organisms were seen in one of these. Three of these seven additionally had acid fast organisms on a fresh impression smear.

Liver flukes were the main reason for offal condemnation and BTB seems to play a small role in food safety from the abattoir with an incidence of 0.12% per year. However, animals that are considered sickly are not slaughtered for sale at public abattoirs and may be slaughtered unofficially where meat inspection does not take place.

While preventing BTB contaminated meat entering the public market, meat inspection alone is not ideal for monitoring of BTB in the animal population given a high proportion of uninspected meat through informal markets reaching consumers.

P3: Optimisation of PMA treatment for selective quantification of live Campylobacter cells with v-PCR

Thomai Lazou, Chrysostomos Dovas, Nikolaos Soultos, Eleni Iossifidou

Viability PCR (v-PCR) using nucleic acid intercalating dyes such as propidium monoazide (PMA) has been launched to selectively quantify viable cells of a targeted microorganism. Ideally, a viability dye exclusively penetrates compromised-membrane dead cells and inhibits their DNA amplification during real-time PCR. Despite v-PCR implementations with encouraging results, suppression of dead cell signals by PMA was not absolute in several previous studies.

The aim of this study was to develop an improved PMA v-PCR protocol for the quantification of viable Campylobacter by optimising the selective PMA entrance in dead cells in populations of viable and dead bacteria, the dye concentration and incubation time. Campylobacter coli (C. coli) ATCC 43478 suspensions of live and dead cells were co-incubated at 37^0C with various concentrations of buffers containing EDTA and lysozyme to further destabilise compromised-membrane dead cells prior to the addition of PMA also in various concentrations and incubation periods. For the detection of C. coli with v-PCR, specific primers and a probe for the detection of the single-copy glyA gene were used.

Compared to direct addition of PMA to C. coli suspensions, pre-incubation with EDTA and lysozyme increased the signal reduction of compromised-membrane dead cells during v-PCR without affecting the membrane integrity of viable cells. The addition of 25 μM PMA and incubation for 20 min were adequate for maximum signal suppression of dead cells.

Pre-treatment of Campylobacter suspensions with membrane destabilising substances prior to the addition of PMA can be highly useful towards maximising signal reduction of dead cells during v-PCR in order to selectively quantify the viable bacteria present. Further research is necessary in order to address the interaction of various sample matrices and membrane-destabilising components on the permeability of bacterial cell envelopes.

P4: Awareness and challenges on the adoption of new procedures for meat inspection in Europe

Lüppo I Ellerbroek

Traditional practices of meat inspection are not always suitable for detecting the main meat-borne hazards such as Campylobacter and Salmonella or contamination by chemical substances such as persistent organic pollutants or prohibited substances. For this reason, the European Commission decided that meat inspection practices in the EU should be modernised to keep zoonotic agents away from the food chain meat. While efforts and optimised holding conditions for animals led to more healthy animals current meat inspection procedures have to be adjusted to this situation. To implement risk based meat inspection without diagnostic cutting procedures at the slaughter line, information from the farm is indispensable and has to include also general information about compliance with integrated production and controlled holding conditions. Vice versa diagnostic findings on carcasses and respectively on organs of the animals during meat inspection are sending back to the farmer. The evaluation of findings in liver and pleura at the slaughterhouse level should be correlated not only to the general health status of the fattening conditions at farm level but also to the animal welfare status of slaughter animals. On the basis of farm data and slaughter conditions the competent authority represented by the official veterinarian can decide on risk based meat inspection without diagnostic cutting procedures at the slaughter line.
New procedures in risk based meat inspection are based on three essential ways:
(1) Forward tracing of FCI, backward tracing of public and animal health as well as animal welfare aspects,
(2) the option of modifications in meat inspection on certain conditions and
(3) continuous collection and monitoring of data for risk assessment, to establish an early warning system on public and animal health trends.

Epidemiology and Zoonoses

P5: Application of predictive microbial modelling approaches to support the assessment of risks from food-borne parasites in cured meat products

Anne Mayer-Scholl, Jennifer Neumann, Karsten Nöckler, Niels Bandick, Christian Thöns, Matthias Filter, Anja Buschulte

Food-borne parasites cause a high burden of disease in humans. They may have severe and sometimes fatal outcomes, and result in considerable hardship in terms of food safety, quality of life, and negative impacts on livelihoods.
One possible approach to control meat-borne parasites is post-harvest processing. Many parasite stages are susceptible to freezing and cooking, if adequate time/ temperature combinations are adhered to. Irradiation can also be an effective control measure and guidelines for some parasites are available. Control measures such as curing, salting, drying are not as reliable and need evaluation for specific parasite/ food combinations.
Curing is a procedure for the purpose of preservation, flavouring and colouring of meat products by addition of sodium chloride, nitrite and/or nitrate and sometimes sugar or spices. There is a great diversity of curing methods making a general prediction about a successful inactivation of parasitic stages in raw meat products impossible. Traditionally, experimental studies are used to validate the inactivation of parasites in specific food products. As bioassays are often needed to confirm infectivity of parasites, these studies are laborious and expensive.
In such a scenario, predictive microbiology is a modern approach to circumvent or reduce the described constraints. Through the application of predictive microbial methods it becomes possible to predict properties of interest based on relevant environmental conditions such as temperature, pH and water activity. These models are widely used to predict the behaviour of pathogens under different combinations of processing parameters.
Here, we report the results of a systematic review on the survival of Trichinella spp. in cured meat products and the preliminary results of mathematical modeling using available literature and research data. Experimental studies are planned to assess the quality of the proposed models, to close identified data gaps, and to increase the validity of future risk assessments.

P6: Impact of emerging poultry production systems on Campylobacter epidemiology and potential implication for human health in Ethiopia

M. C. Brena, Y. Mekonnen, J.M. Bettridge, N. J. Williams, P. Wigley, T.Sisay Tessema, R. M. Christley

Campylobacter is a leading cause of diarrhoea, and its presence in chickens is a significant risk for zoonotic infection. Currently in Ethiopia, there is much interest in developing the poultry industry and enhancing the productivity of backyard chickens. While higher productivity is advantageous to increase food availability, it is important that measures to enhance food security are also evaluated in terms of their ability to produce safe food.

The aim of this study was to investigate the impact of management intensification and the distribution programmes of exotic and/or improved indigenous birds in Ethiopia on the epidemiology of Campylobacter, considering the potential implications for human health in the country.

This cross-sectional study sampled 219 household environments in one periurban and two rural areas of Ethiopia, and an additional 20 semi-intensive farms in the periurban district. For each unit, a single sample was collected from the ground by walking through the household environment or inside the chicken shed using one disposable fabric overshoe (boot sock) worn over the footwear.

Campylobacter was detected by PCR in 44 samples. The greatest risk factor identified in this study for detection of Campylobacter in the environment of the sampled chicken flocks was location in the peri-urban area, where many farms are starting to intensify their production systems. It was also noted that scavenging flocks of exotic high-production birds were at slightly greater risk, perhaps as exotic birds are under more stress when kept under traditional management systems.

Results suggest that changes to the system of chicken production may alter the ecology and epidemiology of Campylobacter, which may drive emergence of new epidemiological patterns of disease. Further work is needed to determine whether other zoonotic pathogens may be similarly affected.

P7: Public health hazards in meat inspection: Mycobacterium avium and Toxoplasma gondii in slaughtered swine in Portugal

Ana Caiado, Ana Gonçalves, Bebiana Enguião, Cristina Ferro, Anabela Santos Silva, Ana Tomás, Alexandra Müller, Eduarda Gomes-Neves

Mycobacterium avium subsp. *hominissuis* (Mah) and *Toxoplasma gondii* are two zoonotic agents of worldwide distribution. Mah is recurrently detected by traditional meat inspection methods whereas *Toxoplasma gondii* is not. Both agents were taken into consideration in the new European Swine Meat Inspection Regulation EU No 219/2014. In Portugal, reports on the prevalence of Mah and T. gondii in swine are scarce.

Objective: To characterize the presence of both agents in slaughtered swine (intensive farm).
Materials and Methods: Mah: Submaxillary lymph nodes with granulomatous lesions of 200 swine from 11 farms were sampled. Samples were processed for culturing, DNA amplification, reverse hybridization and multiplex PCR. *T. gondii*: Sera from 337 animals from 12 farms were tested using a modified direct agglutination method.

Mah was identified in 73% (95% C.I. 65,8 – 78.6) of the samples. 138 of the 145 positive samples came from one of the farms. All samples tested negative by T. gondii serology (95% C.I. 0 – 0.11).

Mah is the main responsible for granulomatous lymphadenitis in swine in Portugal. This justifies the surveillance by traditional meat inspection methods aiming to identify and implement preventive measures in high risk farms.

No serological evidence for the presence of T. gondii was found in intensively managed pigs. Our results differed from other studies in Portugal which found a low proportion of positives in free range pigs. Further studies are required to estimate the prevalence of toxoplasma in Portuguese farms.

An international harmonization of methodology for risk assessment of Mah and T.gondii in pig would be desirable for the implementation of surveillance and monitoring programs in farms as part of the FCI reaching the abattoir and thus enabling the correct implementation of risk-based meat inspection. Further studies with larger sample sizes should be conducted in Portugal.

P8: Prevalence and further characterization of Listeria monocytogenes strains isolated from porcine tonsils at slaughterhouse level

Eleonora Sarno, Lisa Fierz, Taurai Tasara, Roger Stephan

Listeria monocytogenes is an important food-borne pathogen of great concern to public health. *L. monocytogenes* carried by healthy fattening pigs could be a source for entering the food chain during slaughter.

Objective: To obtain microbiological data from pigs at slaughterhouse level in Switzerland, a total of 504 tonsil samples were collected during two sampling visits in 2011 and 2014.

Strains were isolated by culture (ISO 11290-1:2004). Characterization was performed by serotyping and by using multilocus sequence typing (MLST). The occurrence of genetic elements targeting bacterial pathogenicity such as full-length internalin A genes was explored. In addition, tolerance to benzalkonium chloride (BcrABC and Tn6188 genes) and the occurrence of the stress survival islet (lmo0444-lmo0448 region) were investigated.

Overall, 28 L. monocytogenes strains (5.5%) were isolated and further characterized. The majority belonged to serotype 1/2a-lineage II (57.1%) followed by 4b-lineage I (25%) and by 1/2b-lineage I (17.8%). Based on MLST, strains were grouped into 16 clonal complexes and three singletons including a newly designed sequence type (ST768). Genes for full-length internalin A were commonly found. On the other hand, genes for benzalkonium chloride were not detected and only one of the 28 strains tested positive for the stress survival islet.

Based on these data, porcine tonsils can be colonized with *L. monocytogenes* of public health impact. To encounter this threat, prevention of contamination of carcasses and the environment during slaughter is of major importance, in particular adherence to good slaughter hygiene practices. With regard to pig tonsils, special attention must be given to the handling and contamination of head meat and pig tongues.

P9: Assessment of the exposure of the Swiss population to Hepatitis E via the consumption of pork products

Lucie Collineau, Alexandra Müller, Andrea Müller, Roger Stephan, Katharina Stärk

In Europe, Hepatitis E has traditionally been considered as an exotic disease (contaminated water associated). However, recent more intensive Hepatitis E virus (HEV) surveillance has detected an increasing number of non-travel associated infections. Switzerland has seroprevalence of 60% in domestic pigs and 5% in humans. Sources and pathways for human autochthonous exposure are still unclear, but transmission by consumption of pork products (e.g. pig liver) appears to be the most likely source.

The objective of this study was to quantify the risk of exposure to Hepatitis E in the Swiss consumers via the consumption of pork products.

We developed a quantitative exposure assessment based on the Codex Alimentarius framework. First, we established a comprehensive list of food items described as potential HEV sources and relevant according to the Swiss consumption patterns. For the selected items, we described the processing pathways, focusing on steps that influence HEV occurrence at retail, i.e. mostly heat treatment. In addition, 160 pig liver samples originating from pigs of 40 different Swiss fattening

farms were collected at a main slaughterhouse to estimate, using real time RT-PCR, the HEV prevalence with a precision of 5% and a confidence interval of 95%.

The risk assessment will be completed before the ECVPH meeting. From the literature, we identified a number of Swiss pork products sold raw or with minor processing (e.g. dried or smoked sausages), including pig liver products. The prevalence of HEV in pig livers at slaughter established based on our data was 1.3 % (95% C.I. 0.3% - 4.4%). This study will provide an estimate of the exposure of the Swiss consumers to hepatitis E. Major data gaps will also be identified to inform research needs on this emerging zoonosis. The risk model will be applicable in other consumer populations.

P10: Zoonotic hepatitis E virus in wild boar from Portugal

João Rodrigo Mesquita, Ricardo Oliveira, Catarina Coelho, Madalena Vieira-Pinto, Maria São José Nascimento

Hepatitis E virus (HEV) is a zoonotic agent today recognized as a major public health issue in industrialized countries. HEV strains belonging to zoonotic genotype 3 are widely present in swine, being today considered important reservoirs for human disease. Although several reports confirm the wide circulation of HEV among domestic pigs in many European countries, only scarce data are available on the circulation and prevalence of HEV in wild boar

This study describes the detection and molecular characterization of HEV in livers from sylvatic wild boar hunted in Portugal and from stools of a confined wild boar population destined for human consumption. A total of 80 liver samples collected during the hunting season of 2011/2012 and 40 stools collected in February 2012 from a wild boar breeding farm in Portugal were tested by a nested broad-spectrum RT-PCR assay targeting open reading frame (ORF) 1 of HEV.

Twenty livers (25.0%) and 4 stools (10%) were positive for HEV. Phylogenetic analysis showed that all strains clustered with sequences classified as the zoonotic HEV genotype 3 subgenotype e. Sylvatic wild boar strains nucleotide sequence similarity ranged from 89.96% to 99.8%, while nucleotide sequences of captive wild boar showed 100% similarity.

Sylvatic wild boar nucleotide sequence similarity show some extent of genetic heterogeneity among field isolates while nucleotide sequences of captive wild boar suggest that a single strain was circulating in the wild boar farm. This report demonstrates for the first time the circulation of zoonotic HEV in wildlife reservoirs of Portugal adding knowledge to the epidemiology of HEV in wild boar populations. Further studies are required to understand the full extent of HEV transmission to humans through game meat and meat products.

The work was supported by UID/CVT/00772/2013 financed by the Foundation for Science and Technology(FCT)

P11: The effect of enhanced biosecurity on poultry colonisation with Campylobacter spp.

Milen Georgiev, Wendy Beauvais, Javier Guitan

Human campylobacteriosis affects millions worldwide and poultry meat has been identified as the main source of infection. Our aim was to inform policy on the efficacy of Campylobacter control options on farms. We tested the hypothesis that enhanced biosecurity and other factors such as welfare status, hybrid type, the time of thinning and the number of empty days between flocks prevent Campylobacter spp. caecal colonisation at high levels (above 123,000 cfu/g). We estimated the fraction of high-level colonisation that could be averted in the UK assuming causality between factors and colonisation.

We analysed data from over 2,000 poultry batches sampled at slaughter in the UK from 1st September 2011 to 31st August 2013. A random effects logistic regression was employed to account for clustering of batches within farms and adjust for confounding. We estimated population attributable fractions using the prevalence of exposure among cases and risk ratio adjusted for confounders.

Overall, 58.6% of batches were colonised above 123,000 cfu/g and the highest risk of colonisation was in the summer. Enhanced biosecurity reduced the odds of colonisation at thinning OR 0.25 (95%C.I. 0.14-0.47) and, to a lesser extent, at final depopulation OR 0.47 (95%C.I. 0.25-0.89). One to three days between thinning and depopulation and a week between flocks were associated with lower odds of colonisation. There was an association between hybrid type and risk of colonisation. Approximately 1/3 of highly colonised batches would be avoided if biosecurity was enhanced in 50.0% of batches, thinning was avoided in 1/3 of the batches and lower-risk hybrid types were used, assuming a causal link.

On-farm preventions, particularly the enhancement of biosecurity, can reduce the risk of Campylobacter spp. colonisation. On-farm measures can be an important part of the overall control program for Campylobacter spp.

P12: Tracing the source of foodborne disease outbreaks using FoodChain-Lab

Alexander Falenski, Matthias Filter, Christian Thoens, Bernd Appel, Annemarie Kaesbohrer, Armin A. Weiser

Food chains are complex and contain many items and stations. In the past years outbreaks on national and EU level demonstrated that there is a need for an expert software system handling the large amount of different food ingredient deliveries to support investigations on supply chains as well as exposure assessments in crisis situations.

A free, open source software called FoodChain-Lab has been developed to help outbreak examination teams trace sources of food contamination. FoodChain-Lab was developed as a plug-in for the open source data analytics platform Konstanz Information Miner (KNIME) and can be downloaded from http://foodrisklabs.bfr.bund.de.

FoodChain-Lab was applied during the EHEC outbreak in Germany in 2011 and has been used and tested in other outbreak investigations like the Norovirus outbreak in Germany in 2012 or the Hepatitis A outbreak in Europe. During these investigations the software evolved from a data visualization and analyses tool into a tool box for data management, data enrichment, visualization, data analysis and interactive reasoning. Data on food or feed deliveries can be imported via Excel

sheets. An integrated database enables the user to store all relevant information in a structured way on the basis of stations, products, lots and deliveries. Plausibility checks are implemented to ensure high data quality, which is a major challenge in most outbreak situations. The flow of goods can be visualized as a network graph for the focus on delivery chains and also on a geographical map to show spatial dimensions between outbreak clusters and food deliveries.

Food Chain Lab helps to investigate complex data related to food and feed trading especially to support investigation of foodborne outbreaks. The software is being improved to facilitate data handling further and to master upcoming use cases.

P13: Ancient farming styles and old zoonoses: brucellosis and Q fever among pastoralist and smallholder cattle herds in Tanzania

Silvia Alonso, James Wakhungu, Delia Grace, Fred Unger

Brucellosis and Q fever are old and well known zoonosis associated with livestock keeping. They are the cause of reproductive illness in ruminants and are associated with important economic impact at the farm. Both diseases are widespread in the African continent. In Tanzania two main cattle herding styles co-exist: pastoralism (large and extensively raised herds) and smallholder keeping (few animals under zero-grazing). The differences in management practices in both systems are likely to impact the spread and burden of these diseases.

Objective: To estimate the presence in cattle herds of two important reproductive diseases and zoonosis among cattle keeping communities in two different ecological zones in Tanzania and identify factors that may explain differences in burden. Also we will explore farming practices that may be associated with risk of zoonotic transmission.

We conducted a survey among pastoralist (Maasai) communities and smallholder dairy cattle keepers in two regions in Tanzania. Whole blood and serum were collected from cattle and ELISA was done to detect antibodies against *Coxiella burnetii* and *Brucella abortus*. Polymerase Chain reaction (PCR) was used to identify the presence of *C. burnetti*. Questionnaires on farming practices were administered to all participants.

We will present the seroprevalence estimates for both diseases disaggregated by farming type and by area, as well as the proportion of cattle showing infection with Coxiella by PCR. Descriptive statistics about the farms will be presented, and risk factors responsible for differential prevalence identified. We will also discuss the farming practices recorded that may be associated with potential zoonotic risk. The poster will discuss to what extend different management system may explain persistence of these diseases in the studied farming systems and propose tailored options for disease management.

P14: Estimation of the effect of Fasciola hepatica infection on beef cattle performance using Bayesian statistics, adjusting for abattoir liver inspection imperfectness

Stella Mazeri, Gustaf Rydevik, Robert F. Kelly, Neil Sargison, Barend M. deC. Bronsvoort and Ian Handel

Liver fluke, caused by *Fasciola hepatica* is a multi-host parasitic disease affecting many countries worldwide. The infection in cattle mainly manifests as a sub-clinical disease, resulting in indirect production losses, which are difficult to estimate. The lack of obvious clinical signs results in these losses commonly being attributed to other causes such as poor weather conditions or bad quality forage. Moreover, due to the endemic nature of the infection in many countries, affected animals commonly have low levels of infection and it is unclear at what levels parasite burden leads to production losses.

This study aims to estimate the effect of liver fluke infection on beef production and to investigate whether this depends on the extent of infection.

We used a Bayesian approach to build a regression model for the time to recorded slaughter weight, based on age, weight and liver fluke status, taking into account breed and the random effect of farm. The model included sensitivity and specificity estimates of abattoir liver inspection for liver fluke. Using a subset of the data, fibrosis score (0-3) was included as a proxy for severity of fluke infection. Data used were collected at Scotland's largest red meat abattoir between 2012 and 2015.

The posterior estimates indicated that cattle with liver fluke took 6.9%[1.2-12.7 95% credible interval] longer to reach slaughter weight, compared with healthy animals. Moreover, cattle with liver fluke took 7.1%[3.9-10.6%] longer for each unit increase of fibrosis score.

Improved knowledge on the effect of F. hepatica infection on beef production can improve treatment management strategies and encourage more producers to adopt control measures. Further research can investigate the quantitative use of diagnostic tests in predicting parasite burden and production loss in order to establish more efficient and targeted controlled strategies.

P15: Comparison of individual and pooled samples for quantification of antimicrobial resistance genes in swine feces by high-throughput qPCR

Julie Clasen, Anders Mellerup, John Elmerdahl Olsen, Øystein Angen, Anders Folkesson, Nils Toft, Anna Camilla Birkegård

There is a considerable societal interest in the careful monitoring of antimicrobial resistance (AMR) levels in human and animal populations. Sampling and data analysis can be both costly and time consuming. Optimization of sample pooling procedures is therefore important to reduce costs and analysis times. The objective of this study was to estimate how many individual fecal samples are needed to pool to get a representative sample for quantification of AMR-genes in a Danish pig herd.

20 individual fecal samples were collected from one section in a Danish pig herd. One to five rectal fecal samples were taken from each pen with respect to the number of pigs in the pen. A total of 48 pools were made of increasing number of individual samples. The levels of 9 different AMR-genes were quantified using dynamic qPCR arrays on the BioMark HD system(Fluidigm®).DNA was extracted using the Maxwell® 16 Blood DNA Purification Kit (Promega). DNA concentrations were diluted to 40 ng/µl. The efficiency of the primers was determined using standard curves. Obtained results were normalized with 16S ribosomal DNA.

There were large variations in the levels of AMR-genes between individual samples. As the number of samples in a pool increased a decrease in sample variation was observed. A steady state in the sample variation was seen when pooling five or more samples. No significant difference was found between pools of five samples and pools of more. There were a significant difference between pools of five or more samples and pools of less ($p < 0.0001$).

In order to quantify the level of AMR-genes pools of five individual samples will give a result representative of the pig herd. The findings of this study could be used in planning of observational studies.

Preliminary findings of this study have been presented as a poster at the 4th ASM Conference on Antimicrobial Resistance in Zoonotic Bacteria and Foodborne Pathogens

P16: Antimicrobial resistance of human pathogenic Y. enterocolitica and Y. pseudotuberculosis of porcine and human origin and variation between pig farms

Gerty Vanantwerpen, Dirk Berkvens, Lieven De Zutter, Kurt Houf

Yersiniosis is the third most frequently reported zoonosis in Europe and it is caused by human pathogenic *Yersinia enterocolitica* and *Y. pseudotuberculosis*. Consumption of pork is the main source of human infection and healthy pigs have been identified as the primary reservoir. During pig production, antimicrobial agents are administered as treatment or prophylaxis, inducing antibiotic resistance. However little information is available about (1) the susceptibility of human pathogenic *Y. enterocolitica* and *Y. pseudotuberculosis* of porcine and human isolates to antibiotics; (2) the antimicrobial resistance patterns on pig farms and (3) the relation between the antimicrobial use at the farm and the resistance level of porcine isolates.

The antimicrobial resistance of 870 *Y. enterocolitica* isolates from 43 pig farms, 21 Y.

pseudotuberculosis isolates from 7 pig farms and 78 isolates from human origin was analyzed by the MIC broth dilution method. The following antimicrobial agents were tested: amoxicillin, ceftiofur, gentamicin, nalidixic acid, colistin, doxycyclin, tylosin and sulfamethoxazole/trimethoprim.

No porcine *Y. enterocolitica* isolate showed susceptibility to tylosin and amoxicillin, while the highest susceptibility rate was registered for ceftiofur. There were 77 multiresistant porcine *Y. enterocolitica* isolates involving 4 up to 7 antimicrobial agents. All *Y. pseudotuberculosis* isolates were resistant to amoxicillin and susceptible to ceftiofur and gentamicin. Only one *Y. pseudotuberculosis* isolate was multiresistant. All 78 human *Y. enterocolitica* isolates were resistant to tylosin and sensitive to ceftiofur. Thirty-seven isolates were found resistant to 4 up to 6 antimicrobials. Ceftiofur showed the lowest MIC90. Most farms (n=36) harbored 100% sensitive *Y. enterocolitica* isolates to doxycyclin, ceftiofur, nalidixic acid and gentamicin.

In the end, a relation between using antimicrobial agents at the farm and the resistance pattern was not detected.

P17: Evaluation of the effect of administration and treatment dose on fluoroquinolone resistance in Escherichia coli in broilers

Ilias Chantziaras, Filip Boyen, Annemieke Smet, Jeroen Dewulf

Objective: Two experimental studies were performed to study the effect of treatment dose (proper-dose, half-dose, double-dose) and route of administration (oral, intramuscular) with enrofloxacin on fluoroquinolone resistance in *Escherichia coli* in broilers.
Materials and Methods: As soon as all chicks were born, they were inoculated with a mixture of a enrofloxacin-resistant E. coli strain (also rifampicin-resistant) and a reference E. coli strain (rifampicin-resistant, enrofloxacin-susceptible) (experiment 1: inoculum ratio 100:1, experiment 2: 1:100). In total, 90 -individually numbered- chicks were used (45 for each experiment). In total, 6 samplings were performed (day 3,6,9,12,15,22). All treated groups received enrofloxacin for 3 consecutive days (day 6-8). The percentage of enrofloxacin-resistant E. coli colonies compared to the overall E. coli colonies was measured for each chick.
Linear mixed models were used to evaluate the effect of treatment and the effect of treatment dose and route of administration on fluoroquinolone resistance in E. coli in broilers.
Results: Experiment 1: The effect of treatment was not significant ($P = 0.27$). The effect of administration route was not significant ($P = 0.45$). The effect of dose was not significant ($P = 0.032$). Experiment 2: The effect of treatment was significant ($P < 0.01$). The effect of administration route was not significant ($P = 0.038$). The effect of dose was not significant ($P = 0.19$).
Conclusions: Treatment dose, administration route or even the treatment itself with enrofloxacin did not influence the proportion of resistant/susceptible strains in the gut of chickens carrying a high number of bacteria of a fit enrofloxacin resistant strain before onset of treatment. On experiment 2, treatment did select for the presence of the resistant strain. Even though this selective pressure seemed somewhat larger after oral treatment, this was not significant compared with parenteral treatment in the current model. There was no significant effect on selection pressure when the treatment dose was doubled or halved.

P18: Evaluation of the effect of administration and treatment dose on fluoroquinolone resistance in broilers using a bacteriologically fit and a non-fit *Escherichia coli*

Ilias Chantziaras, Filip Boyen, Annemieke Smet, Jeroen Dewulf

We studied the effect of route of administration (parenteral vs. oral) and treatment doses (proper-dosing, over-dosing, under-dosing) on the selection of fluoroquinolone resistance in *Escherichia coli* in broilers. As soon as all chicks were born, they were inoculated with a mixture of an enrofloxacin-rifampicin-resistant E. coli strain (Experiment A: fit strain, Experiment B: non-fit strain) and a reference E. coli strain (rifampicin-resistant, enrofloxacin-susceptible). In total, 90 -individually numbered- chicks were used (45 for each experiment). In total, 6 samplings were performed (day 3, 6, 9, 12, 15, 22). All treated groups received enrofloxacin for 3 consecutive days (day 6-8). The percentage of enrofloxacin-resistant E. coli colonies compared to the overall E. coli colonies was measured for each chick. In total, 540 faecal samples were collected and plated on two petri dishes containing Mc Conkey agar no.3 supplemented with enrofloxacin (0.025 μg/ml) and rifampicin (100 μg/ml) or only supplemented with rifampicin (100 μg/ml). The Spiral Plating technique was used.

Experiment 1: The results showed that for the chicks inoculated with the non-fit enrofloxacin-resistant strain, the strain remained present until day 15 in all groups. At day 22 the strain had disappeared in the control groups but remained present in all treatment groups (with the exception of the parenterally-treated under-dosed group) regardless of route of administration or dose. On experiment 2, the strain was found in all groups throughout the experiment regardless if the animals received treatment or not and regardless the route of administration or dose.

When inoculating the chicks with a non-fit strain an effect of treatment was shown although it is not depending either on dose or route of administration. When the chicks were inoculated with a fit strain, no effect of treatment or route of administration or dose on the selection of AR could be shown.

P19: Assessing the risk of cross-contamination due to the use of antimicrobial medicated feed throughout the trail of feed from the feed-mill to the farm

Maria Eleni Filippitzi, Jeroen Dewulf

The carry-over of traces of antimicrobials used in medicated feed production poses a potential risk to animal and public health through the potential presence of residues in the feed and the potential development of resistance to certain antimicrobials. Traces of antimicrobials may be incorporated into batches of non-medicated feed during their production, transport, delivery and/or storage at the farms, before being fed to animals.

Objective: To quantitatively estimate the potential exposure of pigs to feed which is cross-contaminated with traces of antimicrobials from previously produced, transported and stored medicated feed. The study looks at the different pathways of exposure, with the aim to estimate the total weight of cross-contaminated pig feed produced.

The potential carry-over of antimicrobial traces was assessed - from the feed mill level over the transport truck, and the storage and distribution at the farm level. The model was therefore subdivided in three modules, one for each level and five exposure pathways were considered. The model was built using @Risk® software (Palisade Corporation®) and was run at 10,000 iterations per simulation.

According to the model's calculations and assumptions, it is estimated that approximately C1= 5,04% (0,30% - 21,88%) of the total feed produced can be cross-contaminated via the feed-mill pathway and C2= 4,97% (3,59% - 5,42%) of the total feed produced can be cross-contaminated via the delivery and farm-related pathways.

Despite the low concentrations of antimicrobial residues being detected in the feed transported to the farms after a batch of medicated feed, these pathways should not be underestimated. There is a degree of uncertainty included in the estimations of the model due to the very limited amount of quantitative data available.

P20: Association between biosecurity, herd characteristics, production parameters and antimicrobial usage in pig production in four EU countries

Merel Postma, Annette Backhans, Lucie Collineau, Svenja Loesken, Marie Sjölund, Catherine Belloc, Ulf Emanuelson, Elisabeth Grosse Beilage, Katharina D.C. Stärk and Jeroen Dewulf, on behalf of the MINAPIG consortium

Disease prevention is an import factor in the reduction of antimicrobial usage, a highly debated problem in current animal production, related to antimicrobial resistance and public health concerns. An improved biosecurity status might be one of the actions that could improve overall health status and reduce the necessity of antimicrobials in pig production.

Objective: Assessing associations between level of biosecurity, herd characteristics, production parameters and antimicrobial usage level, in order to advise on best practices for a low antimicrobial usage level with maximum pig health and production.

227 farrow to finish herds in Belgium, France, Germany and Sweden were visited in 2013 within this cross-sectional study. Information was collected on biosecurity status (www.biocheck.ugent.be), antimicrobial usage (www.abcheck.ugent.be), herd characteristics (e.g. farrowing rhythm) and production parameters (e.g. daily weight gain).

The level of internal and external biosecurity were related to each other. The higher the external biosecurity the more weaned piglets per sow per year and a lower antimicrobial usage from birth till slaughter. A longer farrowing rhythm, vaccination against less pathogens or weaning at a later age resulted also in a lower usage.

Biosecurity can improve production results most likely because of improved animal health. At herds with a high disease pressure more vaccines were used and subsequently also more antimicrobials. When weaning at a later age piglets might have developed a better immunity and will be more resilient against pathogenic threats.

This study showed that a reduction in antimicrobial usage from birth till slaughter in pig production could be achieved by using a longer farrowing rhythm, weaning of the piglets at an older age and improvement of the biosecurity status. Policy makers, herd advisors and farmers should benefit from this knowledge in order to reduce the antimicrobial usage on pig herds.

P21: Monitoring PRRS based on laboratory submissions: a simulation study to evaluate detection algorithms performance

Ana Carolina Antunes, Fernanda Dórea, Tariq Halasa, Nils Toft

During the last decade, several studies focused on applying statistical process control (SPC) in syndromic surveillance. The use of these methods for monitoring endemic diseases tested on a regular basis has so far not been explored. Porcine reproductive and respiratory syndrome (PRRS) in Denmark is a good example, where serological tests are compulsory in breeding herds as one of the components of the PRRS surveillance programme. The objective of this study was to assess the performance of several SPC algorithms based on weekly proportions of PRRS positive breeding herds.

The analysis consisted of three steps: (i) the proportion of PRRS positive herds was simulated as a binomial distribution with probability of 0.1 and size corresponding to the weekly number of herds tested, (ii) an increase of the prevalence to 15% and 20% was simulated 2000 times, and (iii) assessment of the performance (sensitivity and timeliness) of the Shewart p chart, the exponentially weighted moving average (EWMA) and cumulative sum (CUSUM).

The highest sensitivities were obtained by EWMA and CUSUM for false alarm rates of 3% and 1% respectively. Shewart p chart had the lowest sensitivity. Increases of the prevalence to 20% were detected faster than 15%. The average number of weeks to generate an alarm was lower for algorithms with a lower sensitivity.

The highest sensitivities were achieved faster for algorithms with a false alarm rate of 3%, corresponding to 2 false alarms per year. This number should be lower in order to keep an appropriate communications strategy between all surveillance stakeholders and the confidence in the system. We showed that small changes in the proportion of PRRS positive herds can be detected in a faster way using SPC, having the potential to be use for monitoring real data.

P22: Case-control study on the effects of the Swiss eradication programme for bovine viral diarrhoea virus on animal health and production

Aurélie Tschopp, Mireille Meylan, Ramona Deiss, Gertraud Schüpbach

Between 2008 and 2012, a mandatory eradication programme for Bovine Virus Diarrhea (BVD) was run in Switzerland. In 2013, the last phase of surveillance began. The prevalence of persistently infected (PI) new-born calves in the population changed from >1.5% in 2008 to <0.1% in 2012. The aim of this project is to evaluate the effects of the eradication programme in Swiss dairy herds on animal health and production. Specific indicators such as fertility parameters, milk yield and quality will be used to quantify changes in animal health comparing before to after the eradication programme.

A matched case-control design was chosen to assess whether changes in health status over time were due to BVD eradication or to other factors. Case farms had at least 2 PI animals detected before or during the eradication. A total of 110 farms were recruited. Health and production data were collected for 2 time periods: before (01.07.2007-30.06.2008) and after the eradication programme

(01.07.2012–30.06.2013). Farmers were interviewed to assess their perceptions regarding the eradication programme.

From the herds with PI animals identified during the eradication programme, 137 fitted in the case definition. Every farmer was contacted and about 40% accepted to participate. Further analyses will evaluate the changes in parameters expected to be influenced by BVD like fertility (service period, pregnancy index, calving interval and non-return rate), disease incidence (number of treatments at the animal level), mastitis incidence, milk yield and quality.

The results of the study will allow to quantify the effects of BVD eradication on animal health and productivity, and to identify the parameters on which BVD infection had the most important impact. This epidemiological assessment will be used to elaborate a cost-benefit analysis of the BVD eradication in Switzerland. The information collected may be used to improve future decisions on implementing new control programmes.

P23: Risk factors for bovine tuberculosis – a case-control study in three French departments

Maud Marsot, Benoit Durand, Axelle Scoizec, Marina Béral, Yoann Mathevon, Ariane Payne, Aurélie Courcoul

Although France is officially free of bovine tuberculosis (bTB), the country is experiencing for some years a slight increase in the incidence and geographical spread of the infection. To eradicate bTB from low incidence regions, it is essential to accurately know the infection risk factors. Several studies identifying bTB risk factors were conducted in the United Kingdom and in Spain but no information was available in France up to date. The objective of this study was to determine the risk factors for bTB occurrence in cattle farms from three of the most problematic French departments (Dordogne, Côte-d'Or and Ardennes).

A case-control study was conducted to compare herds having experienced a bTB breakdown between 2012 and early 2014 with randomly selected controls. A questionnaire on farming practices and direct or indirect contacts between herds was administered to the selected farmers. Other variables of interest related to cattle trade, contacts between neighboring herds on pasture and wildlife were also collected. A conditional logistic regression was then implemented to assess the potential risk factors related to bTB.

A total of 216 herds (72 cases and 144 controls) were investigated. The risk for TB occurrence was mainly related to the presence of a pasture or fence-line contact with a herd that recently experienced a bTB outbreak or will do it soon and to the joint use of water points with this type of cattle herds.

This study showed the importance of between-herd direct contacts (on pasture and at drinking points) on bTB spread in the three French departments studied. The identification of the main risk factors will increase the understanding of bTB dynamics and help the decision-makers to implement adapted and targeted surveillance, biosecurity and control measures in France.

P24: Hedgehogs and mustelid species, major carriers of pathogenic Leptospira, a survey in France 2012 – 2015

Florence Ayral, Zoheira Djelouadji, Vincent Raton, Anne-Laure Zilber, Eva Faure, Florence Baurier, Patrick Gasqui, Gwenaël Vourc'h, Angeli Kodjo, Benoît Combes

Leptospirosis is a potentially fatal zoonosis whose incidence has increased over the last two years (2013-14) in France. Information on circulating strains, both in humans and animals, is lacking although it is crucial for a better understanding of the epidemiology. Beyond Rattus spp., which is reported as the primary source, little is known on leptospiral carriage in other wildlife species that could serve as reservoir for humans and domestic animals. Our aim was to conduct a cross-sectional survey in France to allow a deep understanding of the leptospiral wildlife reservoir using molecular tools.

Based on hunted preys, population control and surveillance programs, wildlife individuals were collected from each of the 30 participating French "départements" (2012-15). The sampling frame targeted 10 individuals from each of the following species, Cervus elaphus, Capreolus capreolus, Sus scrofa, Vulpes vulpes, Martes foina, Martes martes, Lepus europaeus and Oryctolagus cuniculus, to ensure a balanced spatial distribution sampling among the "départements" and additional animal species depending on the opportunities. The kidney tissues were removed after the death and transported to the laboratory for Leptospira detection. PCR-positive samples were subsequently analysed using rrs gene sequencing for species identification and, variable number tandem repeat and multispacer sequence typing for strain characterisation.

Among 3738 individuals from 28 wildlife species, DNA of pathogenic Leptospira was detected in kidney tissues of 5.5% (CI95%= 4.8% - 6.3%) individuals (n=206), more specifically, of 37.5% (CI95%=28.5%-47.1%) hedgehogs (n=42/112) and of 12.6% (CI95%=10.4%–15.0%) mustelid species (n=110/866). Three Leptospira species (L. interrogans, L. kirschneri and L. borgpetersenii) and a large diversity of genogroups were identified. Interestingly, the hedgehogs were associated to L. interrogans genogroup Australis (OR=8.7, CI95%=2.4–31.7) while other species were found infected by various Leptospira genogroups. These results suggested that hedgehogs would be a maintenance host of the genogroup Australis whereas other species are more likely accidental or intermediate hosts.

Molecular epidemiology could then be used to aid the characterisation of leptospiral transmission routes and maintenance in wildlife.

P25: Tularemia outbreaks - New investigations and case studies

Karsten Giffey, Afrim Hamidi, Driton Sylejmani, Arijana Kalaveshi, Naser Ramadani

Also known as rabbit fever and deer fly fever, tularemia is caused by the bacterium Francisella tularensis. This bacterium is found in rabbits, rodents, beavers, squirrels, several domestic, farm animals and the environment they share. People commonly get infected in most of the cases from the bites of infected ticks (wood, dog) and deer flies, and in countries of western Balkan such as Kosovo and Macedonia, the diseases in human is due to the consumption and contact with infected water.

The presentation will give an overview about the outbreaks of tularemia last years in EU and western Balkan countries with focus on Kosovo. Furthermore, the presentation is illustrating the epidemiologic and environmental factors as to identify the sources of infection, modes of transmission and household risk factors.

Data on environmental factors leading to epizootic rodent tularemia and its spread to resettled rural populations living under circumstances of substandard housing, hygiene, and sanitation in EU were evaluated.

From January 2015 to 10th of February 2015, 206 clinical cases have been confirmed. The signs and symptoms in human cases are described and illustrated. In this study contaminated drinking water as a source in tularemia infection is discussed.

The way the organism enters the body frequently dictates the disease and degree of systemic involvement. The disease in people depends on how it is acquired. People also contract it through inhaling dust and hay that have rodent feces and carcasses. After infection, incubation can be a couple of days to weeks, with non-specific symptoms like fever, chills, headache, sore throat and diarrhea.

First results and experience in General preventive measures include protection action is given. In summary, the presentation gives an overview of the responsibility of veterinarians in the sector of Veterinary Public Health.

P26: Pulmonary retroviruses infection in sheep: a retrospective study in a slaughterhouse of Piemonte region, NW Italy

Elena Biasibetti, Daniele De Meneghi, Michele Lamberti, Francesco Bonetto, Elena Grego, Laura Tomassone, Federico Valenza, Silvia Mioletti, MariaTeresa Capucchio

Small Ruminant Lentiviruses (SRLV), causing Visna-Maedi (MV) and Caprine Arthritis-Encephalitis (CAEV), and the Jaagsiekte sheep retrovirus, causing Ovine Pulmonary Adenocarcinoma (OPA) are important Retroviruses affecting lungs of small ruminants.

An epidemiological and pathological study was carried out to evaluate the presence of Ovine Retroviruses from one of the largest small ruminants slaughterhouse in Piemonte, Northwestern Italy. The authors analyzed data collected by veterinary inspectors throughout 2000-2010, stored in the slaughterhouse registers. The computerized Livestock Regional system (ARVET) permitted to evaluate characteristics of affected farms, distribution of both diseases within the Region, as well as to analyze some risk factors (i.e. type of breeding and grazing). Histological (standard fixation, embedding and staining techniques) and molecular biology (PCR and nested-PCR) investigations were performed on lung samples with macroscopical lesions of OPA and MV, collected during the second semester 2012.

Out of the 18,743 adult sheep examined, 5.4% (95%CI: 5.1-5.7) showed MV lesions, and 1.3% (95%CI: 1.2-1.5) OPA lesions. Both histological and molecular biology techniques confirmed MV macroscopical diagnosis in 76% of cases, and OPA in 100% of cases. Macroscopical examination at the slaughterhouse can thus represent a good method to identify retroviral pulmonary infection in small ruminants. Overall data obtained showed that in the study area (1,962.5 km2), 51% of farms bred animals with retroviral lung lesions, and 76% of sheep from the study area were affected.

By evaluating the number of reports in the different types of farming (intensive vs. extensive, zero grazing vs. pasture), there is a highly significant difference in the extent of disease/infection amongst types of breeding. The decrease in disease reports from large farms (>200 sheep) could be related to extensive farming system: open grazing and mountain pasture greatly reduces the strict and continuous contacts between animals, thus the transmission by aerosol of both causative retroviruses.

P27: Characterisation of Scottish sheep farms covered by passive surveillance

Franz Brülisauer

Interpretation of passive surveillance data is limited due to the fact that the source population is largely unknown and the selection criteria for inclusion can only be assumed. In Great Britain animal health suveillance includes the collation and analysis of post mortem diagnoses reached at Disease Surveillance Centres (DSCs) situated in England, Wales and Scotland. The characteristics of sheep farms from which sheep have been submitted for post mortem examination to any of the eight Scottish DSCs were compared with farms without submissions over a three-year-period. The aim of this study was to assess the proportion of farms submitting sheep carcasses, reasons for submission and potential differences between flocks included and excluded by the survellance system.

A cross-sectional design was applied using a stratified random sample of 125 farms. A questionnaire on farm characteristics and flock health was completed during a face-to-face interview. Sixty flock managers recalled submitting a carcase in previous three years. A further 36 indicated they would have done so had they experienced an increase in unexplainable losses. Farms with carcase submissions were located closer to a DSC and tended to be larger and buy more sheep per annum. However only the first difference was statistically significant with a median distances of 25 and 49 km, respectively. Ewe mortality on farms with submissions was 5.2% compared to 6.0% on remaining farms.

A large proportion of the study population considered post mortem examination as a valuable mean to monitor flock health. There was no convincing evidence to suggest that farm practices and flock health differed substantially between flocks with and without submissions. Randomised surveys can help to assess the representativeness of data collected by a passive surveillance system.

Training, Education and Collaboration

P28: Multidisciplinary collaboration across Europe to promote Global Health: the Network for Evaluation of One Health (NEOH)

Marilena Filippitzi, Luís Pedro Carmo, Daniele De Meneghi, Barbara Häsler

Human health and well-being are increasingly affected by global challenges such as malnutrition, emerging and endemic zoonotic diseases, antimicrobial resistance and climate change. A One Health (OH) approach has been proposed to tackle the challenges through accepting that their complexity requires interdisciplinarity. Several OH initiatives have been implemented (e.g. establishment of cross-sectoral coordination, communication and data sharing mechanisms, integrated surveillance systems). However, no standardized methodology exists to evaluate OH initiatives systematically and to quantify the potential advantages of such a holistic approach compared to the traditional single-disciplinary methods. This hinders science-based decision making and effective resource allocation.

The Network for Evaluation of OH (NEOH, http://neoh.onehealthglobal.net/) aims to enable quantitative evaluations of OH initiatives by providing an evaluation protocol and generating evidence on the efficiency and cost-effectiveness of OH activities for experts, stakeholders and policy makers. This would inform sensible and sustainable policies and optimal resource allocation.

Participants from 22 COST and several non-COST countries with expertise in multiple disciplines (e.g. ecology, economics, epidemiology) are working together in four different Working Groups (WGs): WG1, developing a framework, index and protocol to be included in an OH handbook; WG2, applying the handbook in selected case studies using available primary and secondary datasets stemming from ongoing OH projects; WG3, conducting a meta-analysis of the available case-study results to facilitate international comparison and elaborate policy recommendations; WG4, seeking a dialogue with national governments, NGOs, research organizations, and industry throughout the project to ensure that the evidence produced addresses decision-makers' needs.

NEOH is in its first year of operation and the activities to date focused on establishing the network, the elaboration of the handbook content and structure as well as dissemination and engagement activities. NEOH is funded by the European Cooperation for Science and Technology (COST) and has a four year duration (November 2014-November 2018).

P29: eATA: Development of an e-learning module for official veterinarians

Sabine Wanda, Katharina D.C. Stärk, Gertraud Schuepbach-Regula, Nadine Metzger, Uli Muellner

In Switzerland, veterinarians undergoing the training to become an official veterinarian complete a module in epidemiology which covers risk analysis, monitoring and surveillance as well as outbreak investigations (RAMSOI). To increase time efficiency, eLearning was considered as an alternative to face to face teaching, so veterinarians could participate and prepare for the module remotely and study at their own time and pace.

Objective: Development of a blended learning and eLearning module (eATA) for RAMSOI for the Federal Food Safety and Veterinary Office.

Blended learning is a popular concept that combines online and face-to-face learning. RAMSOI will be taught in a total of two days involving one day distance eLearning and one day on site. A

didactic concept was developed for blended learning in the specific context of official veterinarians. The eATA pilot will be provided for a group size of 20-25 people. The target group is veterinarians aged 25 to 55 and with different levels of post-graduate experience in RAMSOI.

A motivating learning environment is considered essential for the success of eATA. The eATA pilot will be provided via the learning platform ILIAS. The module will consist of six learning units. Each unit will include podcasts, videos, case examples, interactive questions and a quiz. Outcome measures are taught using a story-based approach around a case of leptospirosis. The knowledge will be applied to solve the tasks and exercises in discussion rounds and working groups on site on day 2 of the module.

The Swiss eATA pilot will be used in autumn 2015 for the first time and evaluated. Feedback will be formally collected and the module will be adjusted if needed. Similar modules are being developed around Europe. An integrated course could offer opportunities for sharing of material and resources.

P30: Ethical issues to consider when planning veterinary epidemiological studies

Wendy Beauvais, Martin Whiting, Georgina Limon-Vega, Javier Guitian

Veterinary epidemiological studies present specific ethical issues that differ from traditional lab-based research. Observational studies often involve animal owners, who may be at risk of becoming infected or responsible for the safety of their food products. Owners may also be surveyed directly, for example through questionnaires or blood-sampling. The ethical issues raised may not be familiar to ethics committees who are more accustomed to lab-based research, and in some countries where research is carried out there may not be a formal system of legal or ethical review in place.

Our objectives were to:

1. suggest specific ethical considerations for observational studies of livestock diseases; and
2. propose a framework for ethical guidelines.

The components of observational studies of livestock diseases were identified and discussed in relation to possible ethical dilemmas that could arise. A framework was constructed for generating ethical guidelines for such studies.

A number of potential ethical issues pertinent to observational studies of livestock diseases were identified, relating to i) ascertainment of disease-status and ii) ascertainment of exposure-status, involving livestock and/or owners.

The proposed framework for developing ethical guidelines consists of: i) ensuring that research activities are lawful in all countries involved (including the researchers' own countries); ii) ensuring that the research activities are acceptable according to local cultures; iii) submitting applications for ethical approval to the most appropriate committees (multiple if necessary) and iv) complying with the highest available standards described in medical and veterinary journals' ethical guidelines.

Several situations arising in observational studies of livestock diseases require special ethical consideration. Differences in structures and guidelines that veterinarians work within in different countries may cause ethical dilemmas. Ethical guidelines to address common issues in veterinary epidemiological research are needed, particularly for international projects.

P31: Outcomes of research training in the new veterinary school in Adelaide

Michael P Reichel, Darren J Trott and Peter D Cockcroft

The acquisition of research skills forms an integral part of the EBVM training within the Adelaide curriculum. This poster reports the outcomes of a capstone research project undertaken by every veterinary student during the first year of their clinical training.

There is no unified national veterinary curriculum in Australia and the establishment of a new veterinary school in Adelaide provided an opportunity to embed strong elements of evidence-based (clinical) veterinary research training into the curriculum. The "One-Day" skills' training as required by the Australasian Veterinary Boards accreditation process that is administered by the Veterinary Schools Accreditation Advisory Committee (VSAAC) requires students to acquire basic and advanced research skills and be provided with an "opportunity for in-depth research experience to encourage an interest in veterinary research in their future careers."

The Adelaide curriculum was developed to provide systematic research training throughout, to accompany the clinical training, and in a "capstone" course (Clinical research Project) enable students to complete a research project of their choosing.

In the four years that the course has been running, student projects have become increasingly sophisticated, the number of staff willing to supervise projects is increasing and with minimal additional funding pilot projects have been initiated to establish preliminary data for future funding applications. Increasingly these projects are leading to publications in peer-reviewed journals and participation in conferences (national or international). Development of a "Research Day" and proceedings to mark the formal ending of the course, which allow students to present their scientific findings as short talks, or by poster.

Research training can be enhanced by student participation in small research projects that are not intrusive and can be facilitated even by a small faculty, and with minimal course funding.

P32: Development of a world-class, VPH-focussed veterinary school in Hong Kong

Michael P Reichel, Howard KH Wong, Mike I Kotlikoff

City University of Hong Kong, in collaboration with Cornell University's College of Veterinary Medicine has established a School of Veterinary Medicine in March 2014. The expressed intention is to lead research and teaching of Food Safety, Veterinary Public Health, Emerging Infectious diseases and Aquatic Production in the region.

Hong Kong has hitherto not had a veterinary school. Students intending to study veterinary medicine had to go abroad, largely to the UK, the US and Australia. This has meant that students' learning may have lacked the focus on locally pertinent issues. This may be a deficiency when these students return home to practice in Hong Kong.

The School of Veterinary Medicine was established by City University of Hong Kong with an initial focus on postgraduate courses and relevant research, such as opportunities for postgraduate research students pursuing PhD studies and the development on a Master of Science degree in Aquatic Production and Veterinary Health.

14 students have already been enrolled in a PhD program in Veterinary Medicine and Biomedical Sciences with joint-supervision provided both, in Hong Kong and Cornell. The MSc in Aquatic Production and Veterinary Health is expected to commence in the autumn of 2016 with an

initial intake of 25 students. The School will also be offering a Veterinary nursing degree, commencing in 2016 and is active in the provision of Continued Professional Development, locally and in the region.

The establishment of a locally-focused veterinary school, partnering with a top North American veterinary college provides opportunities for students and faculty alike to engage in research and learning with a local focus, but truly global perspective.

P33: "You have an SMS": innovative knowledge transfer for agriculture and health

Silvia Alonso, Edwin Kangethe, Kristina Roesel, Iddo Dror, Delia Grace

Education and knowledge are crucial to empowerment. In developing countries, knowledge transfer to communities in rural areas has been traditionally challenged by limited accessibility, lack of resources and low literacy levels. The large mobile phone coverage in rural areas in low income countries offers a unique opportunity for knowledge dissemination to rural households. We present two examples of projects exploring the use of mobile technologies for knowledge dissemination: mNutrition, health and agriculture nutrition sensitive messages to farmers (multi-country) and mPig, transfer of knowledge on pig production to pig farmers and beyond (Uganda).

Objective: To develop and test SMS based platforms for dissemination of health and agriculture information to rural households in developing countries.

Information relevant to the target country and audience is identified through review of literature and stakeholder consultation; Local experts gather, through a systematic process, evidence-based information to address identified issues; information is encapsulated into relevant and actionable short text messages; a suitable sms delivery platform is identified and programmed; messages are piloted and delivery is then taken to scale. The process is quality assured. Impact studies will be conducted.

The projects are in initial stages. We will present the specifics of each model, in terms of information gathering and message development. We will describe the faced and foreseen challenges and the approaches to addressing those. We will discuss the expected reach of each platform and its potential as a knowledge transfer.

These projects will produce a databank of knowledge on key areas of health and agriculture and related short-text messages. They will also provide evidence on the ability of mobile technologies to reach rural households, to serve as a knowledge dissemination platform and to achieve behavioral change.

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